Learning Contextualized Knowledge Structures for Commonsense Reasoning

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Problem

KG-Augmented Commonsense Question Answering

Input:
Question: Printing on a printer can get expensive because it does what?
Choices: A. explode B. use paper C. store information D. queue E. noise

Output:
B. use paper

Graph Initialization
- Node Set: recognized concepts
- Edge Set: extracted edges from ConceptNet + generated edges

Graph Encoder: jointly learns graph structure (adj matrix) and parameters for reasoning.

Hybrid Graph Network (HGN)

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Complete missing facts
Softly prune unreliable/unrelated facts

Experiments

CommonsenseQA
OpenbookQA

HGN achieves performance gain on commonsense reasoning benchmarks with superior contextualized knowledge structures

Challenges
- Missing facts
- Unreliable facts

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Graph Encoder: operates on static graph structure.

Background

Workflow
Contextualized KG:
Graph Initialization

Prior Work
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Questions:

1. What is a place that usually does not have an elevator and that sometimes has a telephone book?
   - Answer: house

   CommonsenseQA

2. Where would you find an office worker with his colleagues?
   - Answer: water cooler

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